Relative Momentum in US Sectors and Country ETFs

A monthly long-only rotation into the five strongest assets out of sixteen, inverse-volatility weighted, with a 12-1 momentum score.

Sohaib Ali | sohaibmali@outlook.com | November 2026

Universe 9 sectors + 7 country/real assets
Rebalance Monthly
Direction Long only
Sample 2001 - 2026
Platform vectorbt 1.2

7.64%	0.673	-24.3%	$670k	1,653
CAGR, FULL SAMPLE	SHARPE, FULL SAMPLE	MAX DRAWDOWN	ENDING EQUITY	ORDERS, 26 YEARS
SPY 9.02%	SPY 0.550	SPY -55.2%	from $100,000 start	$192.2k total fees

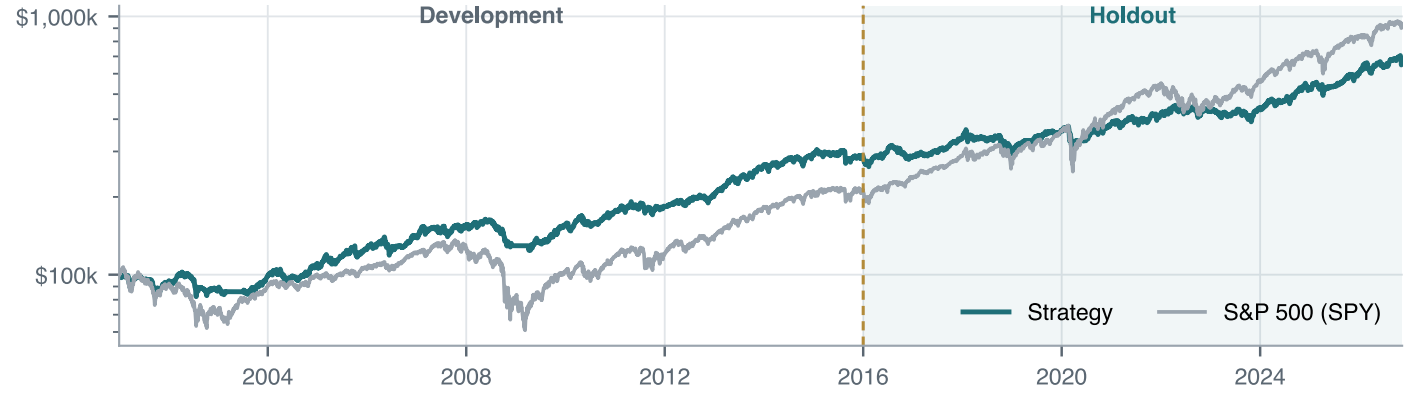
EXECUTIVE SUMMARY

The strategy ranks sixteen US sector, country and real-asset ETFs each month by their 12-month return excluding the most recent month, buys the top five whose score is positive, and weights them inversely to 63-day volatility inside a 12% volatility budget. It is long only and fully invested when enough assets qualify. Over 2001-2026 it returned 7.64% a year with a 0.673 Sharpe and a -24.3% maximum drawdown, against 9.02%, 0.550 and -55.2% for the S&P 500. The result is the weakest of the four books in this series on a walk-forward basis (0.549), because the edge is concentrated in a handful of regimes and the rotation is late when leadership changes abruptly.

KEY TAKEAWAYS

- Momentum rotation beat the index on risk-adjusted terms (0.673 against 0.550) but not on return in the holdout, when mega-cap technology dominated an index the strategy is deliberately spread across.
- 2008 was the failure year: -16.4%, because relative momentum stayed in energy and materials while everything fell. Trend following protected capital that year; relative momentum did not.
- The holdout (0.728 Sharpe) beat development (0.641), but the walk-forward across eleven folds was the weakest of the series at 0.549, which is the number to believe.
- Beta to the S&P 500 is 0.45 and alpha is 3.39% with a t-statistic of 2.04: statistically weaker than the trend books, and honestly reported as such.

Exhibit 1. Growth of $100,000, strategy versus S&P 500 (SPY)

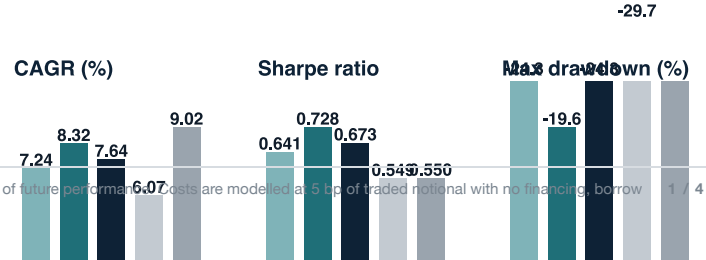


Shaded region is the holdout window (parameters locked before 2016). Log scale.

PERFORMANCE SUMMARY

WINDOW	CAGR	SHARPE	MAX DD
Development 2001-2015	7.24%	0.641	-24.3%
Holdout 2016-2026	8.32%	0.728	-19.6%
Full sample 2001-2026	**7.64%**	**0.673**	**-24.3%**
Walk-forward 2005-2026	6.07%	0.549	-29.7%
S&P 500 (SPY), full	9.02%	0.550	-55.2%

$100,000 grew to $670,225. Average exposure 78%, 2.5% daily turnover, 1,653 orders.



Hypothetical backtested results have inherent limitations, do not reflect actual trading, and are not indicative of future performance. Costs are modelled at 5 bp of traded notional with no financing, borrow or market-impact charge. This document is for informational purposes only and is not investment advice.

1. STRATEGY OVERVIEW

A relative-strength rotation. Every month the book re-ranks its universe, keeps the leaders that are still in positive territory, and equalises risk rather than capital across them. It never shorts and never holds cash beyond the Treasury sleeve.

2. MECHANICS

- **Score.** 12-month total return ending one month ago: price(t-21) / price(t-252) - 1. Skipping the most recent month avoids the short-term reversal that contaminates raw 12-month momentum.
- **Selection.** Rank all sixteen assets by score each month; keep the top five whose score is positive. If fewer than five are positive, the book holds fewer positions and the rest goes to Treasuries.
- **Weighting.** Inverse 63-day volatility within the selected set, normalised to 100%, then scaled so trailing portfolio volatility runs near a 12% target. No single asset can exceed the gross cap.
- **Cadence.** Month-end ranking, next-close execution, hold until the next month-end. 1,653 orders over 26 years.

PARAMETER SPECIFICATION

PARAMETER	LITERATURE	FINAL	NOTE
Momentum lookback	12 months	**12 months**	252 trading days
Skip period	1 month	**1 month**	21 days, avoids short-term reversal
Portfolio size	decile	**5 names**	Top five positive scores
Weighting	equal	**inverse vol**	63-day realised volatility
Volatility target	n/a	**12%**	Book level, cap 100%
Rebalance	Monthly	**Monthly**	Month-end, next close
Universe	stocks	**16 ETFs**	9 US sectors, 3 countries, 4 real assets

Exhibit 2. Rolling 12-month return



Strategy versus buy-and-hold, month-end returns compounded over 12 months.

3. SOURCE OF EDGE AND WHY IT EXISTS

Relative momentum is one of the most replicated anomalies in asset pricing, and also one of the most regime-dependent.

- **Sector and country momentum.** Jegadeesh and Titman (1993) and Moskowitz and Grinblatt (1999) document industry momentum that persists for 3-12 months. Sector rotation is the cleanest expression because it avoids single-stock idiosyncratic risk.
- **Slow information diffusion.** Leadership in sectors and countries changes with the economic cycle. Capital flows and analyst revisions follow performance with a lag, which is the mechanism the 12-1 score tries to capture.
- **Risk equalisation.** Inverse-volatility weights stop a single high-volatility sector (energy, emerging markets) from dominating the book, which improves the Sharpe ratio without changing the ranking.

4. WHERE THE STRATEGY IS EXPECTED TO STRUGGLE

- **Correlated sell-offs.** Relative momentum is fully invested in risky assets. When correlations go to one - 2008, March 2020 - ranking the leaders does not help.
- **Leadership reversals.** Sharp rotations (November 2020, the 2022 energy reversal) leave the book holding last cycle's winners for a month too long.
- **Concentration regimes.** When a handful of mega-caps drive the index, a sixteen-asset rotation underperforms simply because it is not allowed to concentrate in them.
- **Single-month signal.** The score is read once a month; a mid-month crash is not seen until the next rebalance.

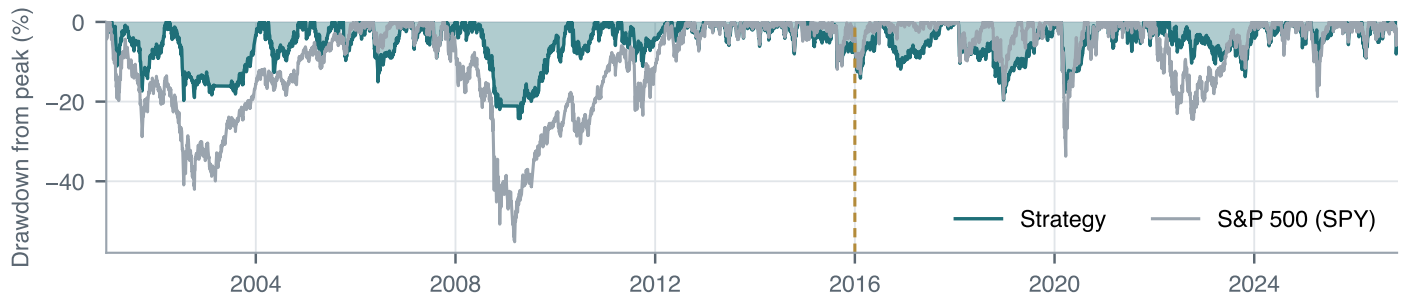
5. BACKTEST SPECIFICATION

Instruments	XLE, XLF, XLK, XLV, XLI, XLP, XLU, XLY, XLB, EFA, EEM, EWJ, VNQ, IYR, GLD, DBC
Data	Adjusted daily OHLCV, 2001-2026
Initial capital	$100,000
Execution	Month-end ranking, next-close fill
Orders	1,653
Fees	$192.2k at 5 bp
Code	quant/qresearch/strategies.py::xsec_momentum

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6. PERFORMANCE ANALYSIS

Exhibit 3. Drawdown from peak



Dashed line marks the start of the out-of-sample window.

Exhibit 4. Calendar-year returns

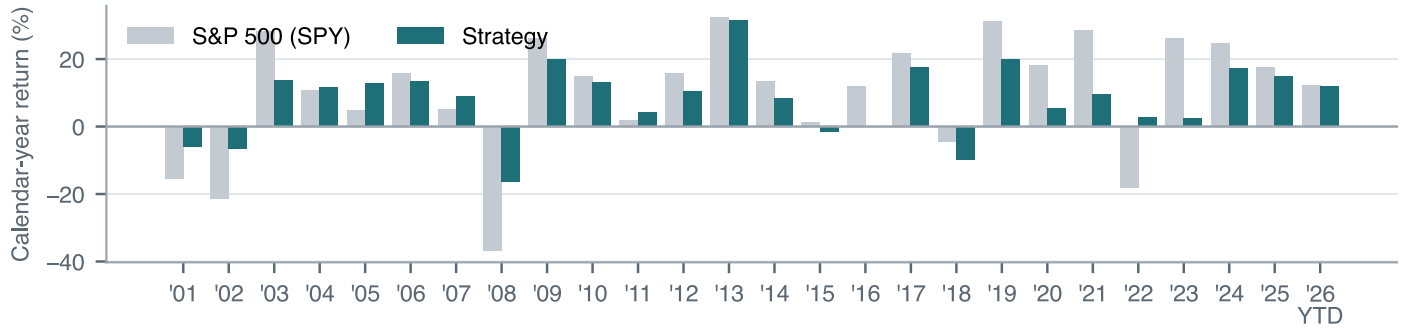
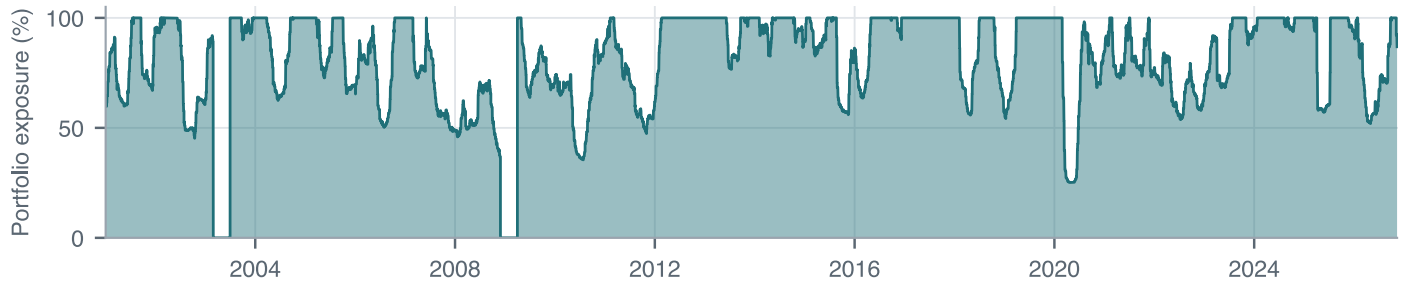


Exhibit 5. Monthly returns of the strategy (%)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2001		-1.6	-4.1	4.5	0.8	-3.2	-0.2	-2.2	-6.1	-1.5	7.0	1.0
2002	1.4	2.3	4.3	-1.8	1.3	-3.7	-7.2	-0.4	-2.9	-0.3	2.8	-2.0
2003	-1.2	0.3	-0.3	0.0	0.0	0.0	0.1	1.3	-1.0	6.9	1.3	5.9
2004	1.8	2.1	0.8	-7.2	0.3	2.7	-1.7	0.7	1.9	1.9	5.5	3.0
2005	-1.4	7.3	-2.2	-2.4	1.3	3.5	4.3	1.1	4.4	-6.1	0.8	2.4
2006	5.5	-2.0	3.3	1.8	-4.8	-1.5	0.9	-0.1	0.1	4.5	4.7	0.8
2007	5.2	-0.4	0.1	1.3	1.4	-3.7	-0.8	0.4	3.8	2.5	-2.5	1.8
2008	-0.6	2.2	-1.9	2.3	2.2	0.7	-4.6	-2.1	-4.3	-9.1	-0.0	-1.9
2009	0.0	0.0	0.0	-1.7	8.8	-3.8	1.8	-0.0	4.7	1.2	5.7	2.4
2010	-4.1	2.6	6.0	2.6	-4.2	-2.9	2.1	-0.4	4.0	3.0	0.6	3.9
2011	0.9	3.5	-0.2	4.7	-2.7	-0.5	-1.3	-0.3	-6.1	6.1	0.2	0.5
2012	0.9	1.3	2.8	0.3	-2.7	3.8	1.9	-0.6	0.6	-1.3	1.2	2.0
2013	4.6	1.3	3.9	4.3	-1.0	-0.1	4.5	-3.0	4.0	3.7	3.6	2.2
2014	-3.7	4.6	0.1	-0.4	2.7	2.1	-1.9	3.7	-2.8	1.9	2.1	0.3
2015	2.6	-0.9	-0.1	-1.3	1.3	-1.6	4.3	-7.2	-1.7	3.9	-0.1	-0.3
2016	-3.7	-1.0	5.6	-0.5	0.7	6.9	2.7	-3.3	-0.7	-3.4	-3.7	1.1
2017	1.1	1.6	-0.4	-0.1	2.2	0.3	2.8	0.7	2.6	3.0	2.6	0.2
2018	5.9	-4.3	-1.2	-0.4	0.5	-1.3	1.0	2.0	0.3	-7.0	-0.5	-5.0
2019	4.6	1.6	2.1	0.5	-2.2	3.8	1.9	3.3	1.2	0.5	-1.1	2.4
2020	-0.0	-9.3	-2.3	1.9	0.7	0.8	6.0	4.3	-2.8	-1.6	5.0	3.6
2021	-0.5	-1.2	1.9	2.9	2.6	-1.6	-0.8	1.0	-1.8	6.0	-3.9	5.3
2022	0.3	0.4	4.4	-2.6	2.7	-3.3	2.0	-0.3	-6.9	6.1	1.8	-1.4
2023	0.3	-4.0	1.3	-0.8	-1.6	3.4	2.7	-2.2	-4.5	-2.7	8.2	3.3
2024	0.1	5.1	2.3	-4.7	2.8	0.5	3.3	2.3	3.4	0.7	6.4	-5.5
2025	5.1	-0.6	-0.9	-2.2	1.1	0.7	1.6	2.2	4.7	1.6	-0.9	1.9
2026	5.8	4.0	-6.5	5.3	1.8	-3.1	1.9	4.2	-0.3	3.5	-4.3	

Months with no position show 0.0.

Exhibit 6. Portfolio exposure over time



Gaps at zero are cash or Treasury-sleeve periods; partial exposure reflects volatility scaling.

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7. RESEARCH PROCESS

V1 **Top-three sectors.** Concentrated three-name rotation: higher return, 29% drawdown, and a Sharpe below the five-name version.

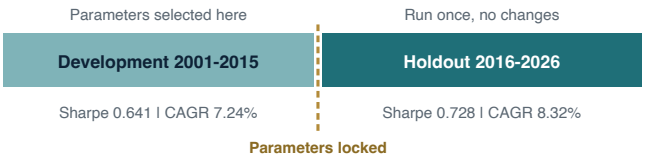
V2 **Top five, equal weight.** Diversifying to five names lifted the Sharpe to 0.60; equal weighting still let energy dominate in 2007-2008.

V3 **Inverse-volatility weights.** Risk-equalising the five names added roughly 0.04 Sharpe and cut the drawdown by three points. Adopted.

REJECTED **Adding a 200-day market filter.** Cutting exposure when SPY was below its 200-day average improved the drawdown but reduced the Sharpe ratio: the filter and the momentum ranking were making the same call twice.

ADOPT **Holdout and walk-forward.** Holdout Sharpe 0.728; walk-forward 0.549 with 0.75 efficiency.

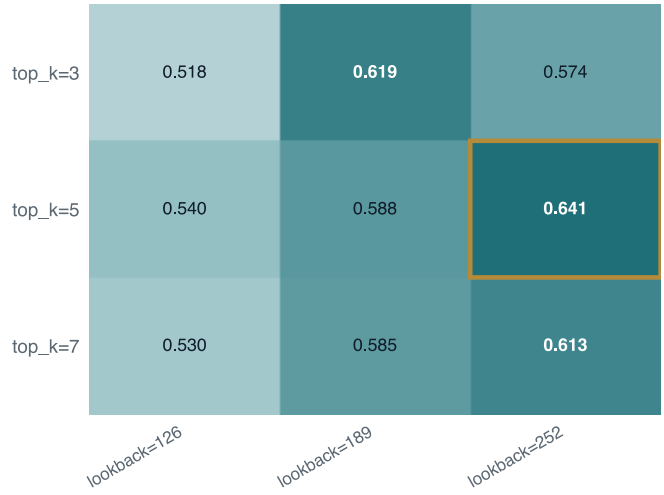
Exhibit 7. Walk-forward design



oldout: Sharpe above 0.45, drawdown below 30%, positive in at least seven of eleven walk-forward fol

GRID DIMENSION	VALUES TESTED
Lookback (days)	126, 189, 252
Portfolio size	3, 5, 7 names
Trials reported	9 (all shown)

Exhibit 8. Development-window Sharpe across the parameter grid



Outlined cell is the adopted configuration. A broad high-Sharpe region, not an isolated peak, is the robustness test.

8. WHY THE RESULT IS UNLIKELY TO BE OVERFIT

- **Holdout fixed in advance.** Grid scored on 2001-2015, holdout run once: 0.728 against 0.641 in development.
- **Nine configurations.** Lookback (126/189/252 days) and portfolio size (3/5/7 names). Nine trials, all reported.
- **Plateau.** Development Sharpe across the grid: 0.641, 0.619, 0.613. The 252-day lookback with five names sits on a broad ridge.
- **Economic anchoring.** The 12-1 skip-month convention is the standard construction in the momentum literature, chosen before looking at this data.
- **Deflated Sharpe.** Deflated for nine trials and 6,503 observations: 0.969.

LIMITATIONS

Weakest walk-forward. Eleven folds produced a 0.549 Sharpe with 0.75 efficiency, the lowest in the series. Selection matters more here than for the trend books.
Long-only, fully invested. The book cannot de-risk except by holding fewer assets; the Treasury sleeve only fills the gap when fewer than five names qualify.
Universe choice. Sixteen ETFs is a small cross-section. A wider universe (single stocks, international sectors) would give the ranking more to work with.
Status. Backtest only, no paper trading.